Physics Lib
Folson

CONTENTS

JANUARY, 1940

Modern Masterpieces 1
Physics in 1939 . . . . . THOMAS H. OSGOOD 2
Theory of the Photographic Latent-Image Formation . . . . . J. H. WEBB 18
Response of Photographic Materials to Atomic Particles . . . . . T. R. WILKINS 35
Physics in Color Photography . . . . . DAVID L. MACADAM 46
Design of Wide-Aperture Photographic Objectives . . . . . R. KINGSLAKE 56
Resumés of Recent Research 70
Pressure and Temperature Effects on the Viscosity of Liquids . . . . . DAVID FRISCH, HENRY EYRING AND JOHN F. KINCAID 75
X-Ray Study of Acetylsalicylic Acid When Incorporated in Certain Sugars . . . . . RONALD L. MCFARLAN AND J. WALLACE REDDIE 80
Ring Focusing of Negative Ions in a Cathode-Ray Beam . . . . . C. H. BACHMAN 83

New Books 71
Recent Booklets 72
Contributors to This Issue 73
Here and There 74
Innovations in Instruments 86

FEBRUARY, 1940

Columbus Meeting 87
Electrical Conductivity of Metals . . . . . JOHN BARDEEN 88
Stresses in Freely Falling Chimneys and Columns . . . . . FRANCIS P. BUNDY 112
Resumés of Recent Research 124
Investigation into the Gettering Powers of Various Metals for the Gases, Hydrogen, Oxygen, Nitrogen, Carbon Dioxide and Air . . . . . LOUIS F. EHRKE AND CHARLES M. SLACK 129
Infra-Red Transmission of Thin Films of Various Organic Materials . . . . . A. J. WELLS 137
Studies in Lubrication. VI. Electrolytic Models of Full Journal Bearings . . . . . F. MORGAN, M. MUSKAT AND D. W. REED 141
Behavior of Willemite Under Electron Bombardment . . . . E. R. PIORE AND G. A. MORTON 153
Letters to the Editor:
Concerning "Physics of Flames and Explosions of Gases" . . . . . W. T. DAVID 157
Answer to Communication by W. T. David . . . . . BERNARD LEWIS AND GUENTHER VON ELBE 158

Here and There 126
Contributors to This Issue 128
Innovations in Instruments iv
Recent Booklets v

MARCH, 1940

Atom Smashing *Versus* Humanity Smashing 159
Ferromagnetic Domains and the Magnetization Curve . . . . WILLIAM FULLER BROWN, JR. 160
Glass as an Electrical Insulator . . . . . C. J. PHILLIPS 173
Resumés of Recent Research 182
Remarks on the Study of Structural Viscosity in Liquids, and the Derivation of Equations for the Flux of Such Liquids Through Tubes . . . . . FRANCIS BREAZEALE 187
Relation of Fluidity to Volume in Organic Liquids . EUGENE C. BINGHAM AND PAUL W. KINNEY 192
Conductivity Measurements on Potassium Halides . . . . . CORNELIUS G. BRENNECKE 202
Studies in Lubrication. VII. The Lubrication of Plane Sliders of Finite Width . . . . . M. MUSKAT, F. MORGAN AND M. W. MERES 208
Formation and Maintenance of Electron and Ion Beams . . . . . LLOYD P. SMITH AND PAUL L. HARTMAN 220
Letter to the Editor:
Mechanism of Static Friction . . . . . M. E. MERCHANT 230

Here and There 183
Contributors to This Issue 185
Innovations in Instruments 186
Recent Booklets 186

APRIL, 1940

Congratulations to the A. S. M. . . . 231
Magnetic Cooling; the Production and Measurement of Temperatures Below 1°K . . . . . CHARLES F. SQUIRE 232
Letters to the Editor:
Correction . . . C. H. BACHMAN 240
Piezoelectric *vs.* Spring Pressure Gauge . . . R. H. KENT AND A. H. HODGE 240
Stellar Temperatures . . . G. P. KUIPER 241
Some Relations Between Molecular Structure and Plasticizing Effect . ARNOLD KIRKPATRICK 255
Diffusion of Hydrogen from Water Through Steel . . . FRANCIS J. NORTON 262
Preferential and Initial Ionic Recombination in Gases . . . N. E. BRADBURY 267
Tension and Birefringence in a Vinylite Plastic . . . H. W. FARWELL 274
Analysis of Symmetrical Vibrating Systems . . . LOUIS A. PIPES 279
Solution of Torsion Problems by Numerical Integration of Poisson's Equation . . . . . R. WELLER, G. H. SHORTLEY AND B. FRIED 283
Polonium Alloy for Spark Plug Electrodes . . . J. H. DILLON 291
Wave Propagation in Shearing Quartz Oscillators of High Frequency . EDWARD W. SANDERS 299

Contributors to This Issue . . . 250
Here and There . . . 251
Recent Booklets . . . 253
Innovations in Instruments . . . 254

MAY, 1940

The Analytical Physicist . . . 301
Trends in Design of Fractionating Pumps . . . KENNETH C. D. HICKMAN 303
Pendulum Analysis in the Scale Industry . . . GLENN R. CARLEY 314
Development of Water-Cooled Quartz Mercury Lamps . . . EDWARD B. NOEL 325
Resumés of Recent Research . . . 337
Note on Heaviside's Expansion Theorem . . . F. H. MILLER 343
Recorder for Electrical Potentials. The Damping of Piezoelectric Systems . FRANKLIN OFFNER 347
Computation of Some Physical Properties of Lubricating Oils at High Pressures. I. Density . . . . . R. B. DOW AND C. E. FINK 353
X-Ray Method of Determining Rates of Diffusion in the Solid State . . . . . JESSE DUMOND AND J. PAUL YOUTZ 357
Use of Radioactive Phosphorus in Soil Studies . . . STANLEY B. BALLARD AND L. A. DEAN 366

Here and There . . . 339
Contributors to This Issue . . . 342
Innovations in Instruments . . . vi

JUNE, 1940

Temperature Scale, a Proposed Change in Definition . . . F. G. BRICKWEDDE 371
Temperature and Temperature Scales . . . H. T. WENSEL 373
Thermoelectric Thermometry . . . WM. F. ROESER 388
Optical Pyrometry . . . W. E. FORSYTHE 408
Temperature Radiation Emissivities and Emittances . . . A. G. WORTHING 421
Mechanism of Spark Discharge in Air at Atmospheric Pressure. I . . . . . LEONARD B. LOEB AND JOHN M. MEEK 438
Conference on Applied Nuclear Physics . . . 448
Apparatus Directory of Temperature-Measuring Equipment . . . iv

Here and There . . . 420, 437, 447, 439
Recent Booklets . . . 450
Contributors to This Issue . . . 450

JULY, 1940

National Defense and the Physicist 451
Spectrochemical Analysis of Sheet Steel at the Great Lakes Steel Company . . . . . R. A. SAWYER AND H. B. VINCENT 452
Mechanism of Spark Discharge in Air at Atmospheric Pressure. II . . . . . LEONARD B. LOEB AND J. M. MEEK 459
Resumés of Recent Research 475
Correlation Method for the Elimination of Errors Due to Unstable Excitation Conditions in Quantitative Spectrum Analysis . . . . . SAUL LEVY 480
Growth Conditions for Single and Optically Mosaic Crystals of Zinc . . . . . C. A. CINNAMON AND ALBERT B. MARTIN 487
Experimental Study of Heat Interchangers . . . . . R. B. JACOBS AND S. C. COLLINS 491
Flow of a Gas Through Porous Media . . . . . J. L. FOWLER AND K. L. HERTEL 496
Electronic Generation of Electromagnetic Oscillations . . . . . E. U. CONDON 502
Letter to the Editor:
Backfiring in Mercury Arc Rectifiers . . . . . JOHN E. WHITE 507

Here and There 458, 477
Contributors to This Issue 479
Innovations in Instruments 508

AUGUST, 1940

National Defense and the Physicist, II 509
Graphical Method for Selecting Suitable Targets for Precision Determination of Cubic Lattice Constants and for Solving Cubic Powder Patterns . . . . . LOUIS A. CARAPELLA 510
Initial Stage of Plastic Deformation in Lead Under Compression . . . . . W. JAMES LYONS 514
Influence of Initial Stress on Elastic Waves . . . . . MAURICE A. BIOT 522
Equations of Finite Differences Applied to Torsional Oscillations of Crankshafts . . . . . MAURICE A. BIOT 530
Theory of Frequency Controlled Oscillators . . . . . SAMUEL SABAROFF 538
Studies in Lubrication. VIII. Lubrication of Plane Sliders . . . . . F. MORGAN, M. MUSKAT AND D. W. REED 541
Rectilinear Electron Flow in Beams . . . . . J. R. PIERCE 548
Temperature Measurement with Blocking-Layer Photo-Cells . . . . . B. M. LARSEN AND W. E. SHENK 555
Letters to the Editor:
Polonium Alloy for Spark Plug Electrodes . . . . . ROBLEY D. EVANS 561
Answer to Communication by R. D. Evans . . . . . J. H. DILLON 562

Here and There 560, 563, 564
Contributors to This Issue 563
Recent Booklets 565
Innovations in Instruments 566

SEPTEMBER, 1940

National Defense and the Physicist, III 567
New Books 568
On the Flow of Suspensions Through Narrow Tubes . F. JOHNSON DIX AND G. W. SCOTT BLAIR 574
Theory of Large Elastic Deformation . . . . . M. MOONEY 582
Breakdown Potentials of Gases Under Alternating Voltages . . G. W. FOX AND D. O. MCCOY 592
Conductivity of Insulating Oils Under Alternating Stress . . . . . J. B. WHITEHEAD AND BUN PO KANG 596
Calculation of the Radiation Properties of Hollow Pipes and Horns . . . . . L. J. CHU 603
Lubrication in Vacuum by Vaporized Thin Metallic Films . . . . . Z. J. ATLEE, J. T. WILSON AND J. C. FILMER 611
Parasitic Electronic Oscillations and Coupling Frequencies in a Power Tube . . RONOLD KING 615
Resumé of Recent Research 621
Letter to the Editor:
Mechanism of Static Friction . . . . . R. SCHNURMANN 624

Contributors to This Issue 622
Here and There 573, 623
Innovations in Instruments iv

OCTOBER, 1940

"The Irresponsibles" . . . 625
New Books . . . 626
Resumés of Recent Research . . . 628
Cuprous-Cupric Oxide Films on Copper . . . C. G. CRUZAN AND H. A. MILEY 631
On the Resistance to the Uniform Motion of a Solid Through a Viscous Liquid . . . RAYMOND B. BLOCK 635
Preparation of High Melting Alloys with the Aid of Electron Bombardment . . . RALPH HULTGREN AND M. H. PAKKALA 643
Measurement of Solid Friction of Plastics . . . ANDREW GEMANT 647
Optical Properties of Colloidal Suspensions in Relation to the Measurement of Particle-Size Frequency . . . E. G. RICHARDSON 653
Velocity of Compressional Waves in Petroleum Fractions at Atmospheric and Elevated Pressures . . . ROBERT MATTESON AND C. J. VOGT 658
Electric Oscillations and Surges in Subdivided Windings . . . REINHOLD RÜDENBERG 665
Dielectric Properties of the Rutile Form of TiO_2 . . . L. J. BERBERICH AND M. E. BELL 681

Contributors to This Issue . . . 693
Here and There . . . 694

NOVEMBER, 1940

What is a Physicist? . . . 697
Flame Temperature . . . BERNARD LEWIS AND GUENTHER VON ELBE 698
Resumés of Recent Research . . . 707
Mechanical Model for the Motion of Electrons in a Magnetic Field . . . ALBERT ROSE 711
Notes on the Power Factor Testing of Long Lengths of Cables . . . ERIC A. WALKER 717
Similarity of the Stress Distributions in a Circular Disk and a Square Plate . . . H. ÔKUBO 720
Stress Analysis by Three-Dimensional Photoelastic Methods . . . DANIEL C. DRUCKER AND RAYMOND D. MINDLIN 724
Atomic Distribution in Aluminum-Silver Alloys During Aging . . . CHARLES S. BARRETT AND ALFRED H. GEISLER 733
Studies in Lubrication. IX. The Effect of the Pressure Variation of Viscosity on the Lubrication of Plane Sliders . . . M. MUSKAT AND H. H. EVINGER 739

Here and There . . . 708
Contributors to This Issue . . . 710
Innovations in Instruments . . . vi
Instrument Booklets . . . viii

DECEMBER, 1940

"A Way of Total Peace" . . . 749
Qualitative Spectrochemical Analysis in Agriculture and Geochemistry . STANLEY S. BALLARD 750
Flow of Air Through Porous Media . . . R. R. SULLIVAN AND K. L. HERTEL 761
Spark Gaps with Short Time Lag . . . JOSEPH SLEPIAN AND W. E. BERKEY 765
Thermoplastic Behavior of Linear and Three-Dimensional Polymers . . . S. S. KISTLER 769
Changes in the Absorption Spectrum of Pb and Ni Films at Low Temperatures . . . CHARLES F. SQUIRE 779
Theory of the Cyclotron . . . ROBERT R. WILSON 781
Electrolytic Polishing. II . . . W. C. ELMORE 797
Graphical Method for Selecting Suitable Radiations for the Precision Determination of Noncubic Lattice Constants and for Indexing Back-Reflection Lines in Powder X-Ray Photograms . . . LOUIS A. CARAPELLA 800
Introduction to the Problem of the Isochronous Hairspring . . . S. GOUDSMIT AND MING-CHEN WANG 806
Concentrator of Eddy Currents for Zonal Heating of Steel Parts . G. BABAT AND M. LOSINSKY 816

Here and There . . . 759
Contributors to This Issue . . . 760
Author Index . . . 824
Subject Index . . . 827
Volume Table of Contents . . . III